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AUTHOR Vondrak, Maripatricia
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ABSTRACT

A study examined the effects of preschool attendance on third graders' mathematics achievement. The subjects for the study were randomly selected from 111 third graders from a predominantly low socioeconomic neighborhood in Chicago. All students were from minority groups. The experimental group was comprised of 21 students who had attended preschool, and the control group of 21 students was comprised of third graders who had not attended preschool. A posttest-only control group design was used to compare the mathematics achievement test scores from the Iowa Test of Basic Skills (administered in 1990) or the La Prueba Test (administered in 1984) of both groups of subjects. Findings indicated that there was no significant difference between the experimental and control groups in mathematics achievement. (Contains 12 references.) (KDFB)

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THE EFFECT OF PRESCHOOL EDUCATION ON MATH ACHIEVEMENT

Maripatricia Vondrak

In the field of preschool education, much attention has been given to preparing young children for formal schooling. Children who attend preschool are thought to be at an advantage over those who do not attend. There are many young children who are attending or have attended preschool. The programs vary from school to school, with emphasis is on social and academic achievement. Many studies have been conducted to determine the success of preschool education. The research proves inconclusive as some studies show significance in achievement while others indicate as the child progresses through the grades, there is very little significance between those who attended preschool and those who did not.

Government funds for at-risk and economically disadvantaged young children are available. Efforts of researchers and funding for preschool education has increased in recent years. There seems to be continuing debate regarding the degree of significance preschool plays in the academic achievement of students and its' lasting effects . The effects need to be measured to determine success factors in achievement. With this information, educators can make decisions about funds and programs for their schools.

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In 1911, Rachel and Margaret MacMillan established the first nursery school. It provided child care from morning to evening. The school elements included nature, physical movement, music and art. The Bank Street School for Children, formerly known as the Bureau for Educational Experiments, was founded by Lucy Sprague Mitchell in 1916. Viewing the child by experts (pediatricians, psychologists, educators and researchers) allowed for experiments where early childhood programs were developed.

The United States Government established Operation Head Start in 1964. This program allowed for self-esteem, independence, motivation and ability to learn with success. Parent involvement is an essential component of Head Start and holds true today.

The 1990 Census Bureau data indicates 59.2% of all young children are enrolled in preschools. The importance of preschool education is not a largely debated topic in 1996. Much depends on the economic and working status of the mother. Opinions range from keeping the child in the home setting until the age of five or six, to infant child care in a formal setting. Many preschool programs are federally funded to allow the disadvantaged opportunities for educational experiences. Expanding the child's experiences beyond the home is the motivation to enroll youngsters in preschool. Social and academic aspects are important features of the preschool curriculum.

For this study preschool is defined by the data in school records of students who attended school before kindergarten. Math achievement is defined by the scores of the Iowa Test of Basic Skills or La Prueba Riverside de Realizacion in Espanol (Spanish-language achievement test).

Longitudinal studies on the effects of preschool education have been conducted. The studies vary in their outcomes. Reynolds (1995) investigated the effects of the federally funded Child Parent Center preschool program on several cognitive and social outcomes through sixth grade. Seven hundred fifty-seven low-income Black children in the inner city enrolled in 1 or 2 years of a Head Start-type program at age 3 or 4. One hundred thirty Black children from similar neighborhoods entered the centers in kindergarten and served as a no-preschool comparison group. Results indicated that while 2-year participants began and ended kindergarten more academically competent than 1-year participants, through the elementary grades these children did not significantly or meaningfully differ from one another in reading comprehension, mathematics achievement, teacher ratings of social adjustment, rates of grade retention and special education placement, and teacher-rated parental school involvement.

Bowlin (1991) examined the effect of a preschool program on achievement of first through fourth grade students in reading and

math. The subjects of this study were 208 elementary students from Estill County (Kentucky) School District. All the students were white, from low to middle socioeconomic classes. The experimental group included all students who had attended preschool. The control group was selected randomly from all the students in first, second, third and fourth grades who did not have preschool experience. Some research has shown that children who attend preschool outperform children who do not attend preschool on standardized test in later grades. Other evidence suggests that preschool experience may result in reduced placement in compensatory education, less retention in grade, and improved life chances, especially for disadvantaged children. However, formal academic programs in preschool may fail to have desired social results and produce no significant differences in academic gains.

Urban high school minority group students with differential preschool program histories were compared to controls on measures of school achievement, school sentiment, and perceptions of the preschool experience (Evans, 1985). Preschool exit attainments were also examined in relation to follow-up achievement and attitude measures. No main long-term effects for differential preschool programs were revealed, nor did follow-up measures distinguish between the total preschool sample and controls. Moderately positive correlations were revealed between several preschool exit criterion measures and later school achievement, but

not attitude. Favorable student evaluations of preschool were observed, as was a general consensus about the reasons for going to preschool.

Miller and Bizzell (1983) studied long-term effects of four preschool programs in the sixth, seventh and eighth grades. 60 % to 65% of the children who were in 4 prekindergarten programs for 1 year in 1968-1969 were compared at sixth, seventh and eighth grades on IQ and school achievement. IQs did not differ significantly among the program groups, but in reading and math there were differential effects related to both preschool program and sex in all 3 middle-school years.

Kohart's (1994) study indicated a positive effect on language related skills, particularly for males. Her study examined the relationship between language related achievement test scores between first graders with preschool experience and those without. Subjects from Antwerp Elementary in Antwerp, Ohio, a small rural community, were 19 first-graders who had attended preschool and 39 who had not. Scores were compared between the two groups. Analyses revealed that there was no significant difference among the two groups of children. The results suggest that language achievement test scores are not indicative of preschool effectiveness.

Anderson (1994) reported on the effects of preschool education on academic achievement of at-risk, minority group kindergarten children. At the beginning of the year, in order to determine the grouping of students according to readiness ability, the Test of Basic Experiences was administered. The groups consisted of those who attended preschool and those who did not attend. A comparison of the test results found a statistically significant difference between the two groups.

Sevigny (1987) examined students who participated in an Education Consolidation and Improvement Act Chapter 1 preschool program in 1973-1974 , compared with an equal number not in the preschool program, and both groups were followed for 13 years through grade 12. The preschool group achieved at a higher level than did controls and out-performed them on standardized reading tests from grades 3 through 11. The preschool group had higher grade point averages and exhibited better school behavior than did the control group. Differences in mathematics were not as pronounced, but the preschool group scored at a higher level in grades 4 through 8. The preschool program made a significant difference in the academic success of these students.

Gullo and Burton (1992) studied the effects of children's age of entry, number of years of preschool, and sex on academic readiness at the end of kindergarten. A total of 4,539 children participated in

the study. Of these, 104 children started in public school at age 3 (K3 group), 1,234 started school at age 4 (K4 group), and 3,201 started at age 5 (K5 group). Analyses indicated that children who entered the public school preschool program at K3 or K4 scored significantly higher on the Metropolitan Readiness Test than children who entered at K5. The findings also indicated that if children were the youngest in the class they did not scores as high as their older counterparts in the K4 and K5 groups. However, no difference was found on achievement scores between the oldest and the youngest for the K3 group.

Literature on research relating to the effect of preschool education and math achievement seemed inconclusive. The studies indicated that those who attended preschool did well in kindergarten compared with those who did not. At the first grade level and beyond, recent research findings indicate achievements in both groups of children are comparable.

Procedures

Population/Sample

The population for this study will include 111 third grade students. The students attend McCormick Public School which is located in a predominantly low socioeconomic neighborhood in Chicago. The population is comprised of 100% minority students. From the 111

third grade students, the records show that 21 attended preschool and 90 did not. The experimental group included all students who had attended preschool. The control group was selected randomly from all the students in the third grade who did not attend preschool.

Each spring the Iowa Test of Basic Skills (ITBS) or La Prueba Test are administered to each student in Chicago's Public elementary schools. Two samples groups of third grade students were identified from the school records of those students who had attended preschool and those who did not. The mathematics results of the ITBS and La Prueba Test administered during the Spring of 1995 will be used in this study. The posttest only control group design will be employed.

The findings were tabulated in terms of means and standard deviations. Calculations were made utilizing grade equivalent scores. The t test for independent samples were utilized at the .05 level of confidence to measure any statistically significant difference between the mean scores.

Findings

The samples for the study included third grade students of McCormick Elementary School. From these third grade students, two groups were randomly selected. Subjects in one group

attended preschool while subjects in the other group did not attend preschool. Results from the 1990 ITBS and 1984 La Prueba mathematics subtests were used . A t test ($p < .05$) for independent samples was done on these two sets of scores to determine if there was a statistically significant change in mathematics achievement after attending a preschool program. Table 1 summarizes the statistical analyses.

Table 1

Means, Standard Deviations, and t Tests for the Experimental Group and Control Group for Mathematics Achievement Scores

Test	Experimental N=21	Control N=21	t
M	32	31	
SD	11.26	8.22	0.328

df = 40 $p < .05$

Examination of the test scores reveals after attending preschool, the Control group's mean in mathematics is 32, while the Experimental group's mean is 31. Thus there is no statistically significant increase or decrease in mathematics achievement of the E-group or C-group.

Overall, the data leads to the acceptance of the null hypothesis: Third grade students who attended preschool will not obtain

significantly different math achievement scores from those who did not attend preschool.

The results of research findings in this study indicate that academically, students who did not attend preschool achieved at a comparable level to those who attended preschool. The results of this study, however, were inconclusive with the research findings in the review of literature.

The review of literature showed that in some studies preschool attendance made a significant difference in academic achievement. Some studies, however, showed little or no difference academically.

Preschool attendance is important in that students are prepared to work in groups, learn some social skills as well as follow directions. Preschool should be implemented in all public schools with a standard amount of time devoted to cognitive development. Preschool teacher certification should be mandatory. For further research, a larger sample/population should be utilized. Longitudinal studies of academic achievement of preschool participants need to be researched.

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